

CLAIMS

1. A lighting control system, comprising at least one local device, and a plurality of lighting devices,

5 wherein the local device includes a first transmitter portion that transmits information for controlling light intensities of the lighting devices via a transmission medium, and transmits the information by the first transmitter portion;

10 wherein the lighting devices include a first receiver portion that can receive the transmission medium and that extracts the information from the transmission medium, a control portion that controls a light intensity based on the content of the information extracted by the first receiver portion, and a light source whose light intensity is controlled by the control portion;

15 wherein a lighting device to be selected is specified based on any of selection of ID information for identifying the lighting devices in the local device, directional characteristics of emission of the transmission medium in the first transmitter portion, and directional characteristics of reception of the transmission medium in the first receiver portion of the lighting devices; and

20 wherein the control portion controls the light intensity in the selected lighting device, based on the content of the information extracted by the first receiver portion.

2. A lighting control system, comprising at least one local device that can send selection information capable of representing selection of a lighting device as
25 an optical signal, and a plurality of lighting devices that can receive the selection

information,

wherein the local device includes an operating portion that instructs an operation of the lighting devices, and a first transmitter portion that transmits the content of instruction by the operating portion, and the local device transmits
5 the selection information from the first transmitter portion in accordance with the content of instruction by the operating portion;

wherein the lighting devices include a first receiver portion that can receive the selection information, a control portion that controls a light intensity in accordance with the content received by the first receiver portion, and a light
10 source whose light intensity is controlled by the control portion;

wherein at least one of the first transmitter portion and the first receiver portion is provided with directional characteristics; and

wherein the plurality of lighting devices judge the presence or absence of reception of the selection information, and the control portion controls the light
15 intensity of the light source in accordance with said presence or absence.

3. A lighting control system, comprising at least one local device that can send light intensity setting information that is information relating to a set light intensity as an optical signal, and a plurality of lighting devices that can receive
20 the light intensity setting information,

wherein the local device includes a setting portion that sets a light intensity, and a first transmitter portion that transmits the light intensity setting information set by the setting portion as an optical signal;

wherein the lighting devices include a first receiver portion that can
25 receive the light intensity setting information on the optical signal, a control

portion that controls a light intensity based on the received light intensity setting information, and a light source whose light intensity is controlled by the control portion;

wherein at least one of the first transmitter portion and the first receiver
5 portion is provided with directional characteristics; and

wherein, in a lighting device that is included in the plurality of lighting devices and that received the light intensity setting information, the control portion controls the light intensity of the light source based on the received light intensity setting information.

10

4. A lighting control system, comprising at least one local device that can transmit a comparison result between a target illumination and a sampled illumination, and a plurality of lighting devices that can receive the comparison result,

15

wherein the local device includes a storage portion in which target illumination information is stored, a sampling portion that acquires sampled illumination information that is information indicating an illumination resulting from light intensities of the plurality of lighting devices, a comparison portion that compares the target illumination information and the sampled illumination
20 information, and a first transmitter portion that transmits a comparison result in the comparison portion;

20

wherein the lighting devices include a first receiver portion that can receive the comparison result transmitted by the first transmitter portion, a judgment portion that carries out a predetermined judgment based on the
25 received comparison result, a control portion that controls a light intensity based

25

on a judgment result of the judgment portion, and a light source whose light intensity is controlled by the control portion;

wherein at least one of the first transmitter portion and the first receiver portion is provided with directional characteristics, and

5 wherein, in a lighting device that is included in the plurality of lighting devices and that received the comparison result, the control portion controls the light intensity of the light source based on the judgment result such that the sampled illumination approaches the target illumination.

10 5. A lighting control system, comprising at least one local device that can transmit a comparison result between a target illumination and a sampled illumination, and a plurality of lighting devices that can receive the comparison result and to which ID information is assigned,

wherein the local device includes a storage portion in which target
15 illumination information is stored, a sampling portion that acquires sampled illumination information that is information indicating an illumination resulting from light intensities of the plurality of lighting devices, a comparison portion that compares the target illumination information and the sampled illumination information, a first transmitter portion that transmits the comparison result in
20 the comparison portion, and a second receiver portion that can receive the ID information of the lighting devices, and the first transmitter portion transmits at least one of the received ID information included in the ID information transmitted from the plurality of lighting devices, in addition to the comparison result;

25 wherein the lighting devices include an ID storage portion in which the

assigned ID information of their own is stored, a second transmitter portion that transmits the ID information of their own, a first receiver portion that can receive the comparison result and the ID information that are transmitted by the first transmitter portion, a judgment portion that carries out a predetermined
5 judgment based on the received comparison result and the received ID information, a control portion that controls a light intensity in accordance with a judgment result of the judgment portion, and a light source whose light intensity is controlled by the control portion;

wherein at least one of the first transmitter portion, the first receiver
10 portion, the second transmitter portion and the second receiver portion is provided with directional characteristics; and

wherein, in a lighting device that is included in the plurality of lighting devices and that received the comparison result and the ID information that are transmitted from the local device, when the judgment portion judges that the ID
15 information of its own is included in the received ID information, the control portion controls the light intensity of the light source based on the judgment result such that the sampled illumination approaches the target illumination.

6. A lighting control system, comprising at least one local device that can
20 transmit a comparison result between a target illumination and a sampled illumination, and a plurality of lighting devices that can receive the comparison result and to which ID information is assigned,

wherein the local device includes a storage portion in which target illumination information is stored, a sampling portion that acquires sampled
25 illumination information that is information indicating an illumination resulting

from light intensities of the plurality of lighting devices, a comparison portion that compares the target illumination information and the sampled illumination information, a first transmitter portion that transmits the comparison result in the comparison portion, and a second receiver portion that can receive the ID
5 information of the lighting devices, and the first transmitter portion transmits at least one of the ID information that could be received from the plurality of lighting devices, in addition to the comparison result;

wherein the lighting devices include a first receiver portion that can receive the comparison result and the ID information that are transmitted by the
10 first transmitter portion, a judgment portion that carries out a predetermined judgment based on the received comparison result and the received ID information, a control portion that controls a light intensity based on a judgment result of the judgment portion, a light source whose light intensity is controlled by the control portion, and an ID storage portion in which the assigned ID
15 information of their own is stored, and the lighting devices superpose the ID information of their own on the light intensities with the control portion and transmits them to the local device;

wherein at least one of the first transmitter portion, the first receiver portion, the light source and the second receiver portion is provided with
20 directional characteristics; and

wherein, in a lighting device included in the plurality of lighting devices and that received the comparison result and the ID information that are transmitted from the local device, when the judgment portion judges that the ID information of its own is included in the received ID information, the control
25 portion controls the light intensity of the light source in accordance with a

judgment result based on the comparison result such that the sampled illumination approaches the target illumination.

7. A lighting control system, comprising at least one local device that can
5 transmit a comparison result between a target illumination and a sampled illumination, and a plurality of lighting devices that can receive the comparison result an to which ID information is assigned,

wherein the local device includes a storage portion in which target illumination information is stored, a sampling portion that acquires sampled
10 illumination information that is information indicating an illumination resulting from light intensities of the plurality of lighting devices and that stores the ID information, a comparison portion that compares the target illumination information and the sampled illumination information, a first transmitter portion that transmits the comparison result in the comparison portion as an optical
15 signal, and an ID extraction portion that extracts the ID information from the information acquired by the sampling portion, and the first transmitter portion transmits at least one of the ID information extracted by the ID extraction portion, in addition to the comparison result;

wherein the lighting devices include a first receiver portion that can
20 receive the comparison result and the ID information that are transmitted by the first transmitter portion, a judgment portion that carries out a predetermined judgment based on the comparison result and the ID information that are received, a control portion that controls a light intensity in accordance with a judgment result of the judgment portion, a light source whose light intensity is
25 controlled by the control portion, and an ID storage portion in which the assigned

ID information of their own is stored, and the lighting devices superpose the ID information of their own on the light intensities with the control portion and transmits them to the local device;

wherein at least one of the first transmitter portion, the first receiver
5 portion, the light source and the sampling portion is provided with directional characteristics; and

wherein, in a lighting device that is included in the plurality of lighting devices and that could receive the comparison result and the ID information transmitted from the local device, when the judgment portion judges that the ID
10 information of its own is included in the received ID information, the control portion controls the light intensity of the light source in accordance with a judgment result based on the comparison result such that the sampled illumination approaches the target illumination.

15 8. A lighting control system, comprising at least one local device that can transmit a comparison result between a target illumination and a sampled illumination, and a plurality of lighting devices that can receive the comparison result and to which ID information is assigned,

wherein the local device includes a storage portion in which target
20 illumination information is stored, a sampling portion that acquires sampled illumination information that is information indicating an illumination resulting from light intensities of the plurality of lighting devices, a comparison portion that compares the target illumination information and the sampled illumination information, and a first transmitter portion that transmits the comparison result
25 in the comparison portion, and the first transmitter portion transmits at least one

of the ID information of the lighting devices, in addition to the comparison result, to designate the lighting device(s);

wherein the lighting devices include a first receiver portion that can receive the comparison result and the ID information that are transmitted by the first transmitter portion, a judgment portion that carries out a predetermined judgment based on the comparison result and the ID information that are received, a control portion that controls a light intensity based on a judgment result of the judgment portion, and a light source whose light intensity is controlled by the control portion:

wherein at least one of the first transmitter portion and the first receiver portion is provided with directional characteristics; and

wherein, in a lighting device that is included the plurality of lighting devices and that received the comparison result and the ID information that are transmitted from the local device, when the judgment portion judges that the ID information of its own is included in the received ID information, the control portion controls the light intensity of the light source in accordance with the judgment result such that the sampled illumination approaches the target illumination.

9. The lighting control system according to any of claims 5 to 8,

wherein the first receiver portion has a transmission-reception function to enable transmission and reception among the plurality of lighting devices.

10. The lighting control system according to any of claims 4 to 8,

wherein communication between the first receiver portion and the first

transmitter portion is carried out via an optical signal.

11. The lighting control system according to claim 5,
wherein communication between the second receiver portion and the
5 second transmitter portion is carried out via an optical signal.

12. The lighting control system according to any of claims 5 to 8,
wherein the local device selects the lighting device(s) by selecting at least
one of, or all of the received ID information and transmitting the ID information
10 to the lighting devices.

13. The lighting control system according to any of claims 1 to 8,
wherein, when selection by the directional characteristics, or selection by
receiving the selection information, the light intensity setting information, the
15 comparison result, and the ID information of its own is not made, each of the
lighting devices is controlled such that the light source is not lighted up or that
the light intensity is changed to a predetermined value or lower after a
predetermined time.

20 14. The lighting control system according to any of claims 4 to 8,
wherein the comparison portion outputs information on which of the
sampled illumination and the target illumination is larger as a comparison result,
and, in the lighting devices, the control portion reduces the light intensity of the
light source when a comparison result that the sampled illumination is larger
25 than the target illumination is received and the judgment portion judges that the

light intensity should be reduced, and the control portion increases the light intensity of the light source when a comparison result that the sampled illumination is smaller than the target illumination is received and the judgment portion judges that the light intensity should be increased, thereby causing the
5 sampled illumination to approach the target illumination.

15. The lighting control system according to any of claims 4 to 8,
wherein the comparison portion outputs information on which of the sampled illumination and the target illumination is larger as a comparison result,
10 and, in the lighting devices, the control portion carries out control to reduce the light intensity of the light source by a first predetermined value when a comparison result that the sampled illumination is larger than the target illumination is received and the judgment portion judges that the light intensity should be reduced, the control portion carries out control to increase the light
15 intensity of the light source by a second predetermined value when a comparison result that the sampled illumination is smaller than the target illumination is received and the judgment portion judges that the light intensity should be increased, and each of the lighting devices selects at least one of the first predetermined value and the second predetermined value as a random value,
20 thereby causing the sampled illumination to approach the target illumination.

16. The lighting control system according to any of claims 4 to 8,
wherein the comparison portion outputs information on which of the sampled illumination and the target illumination is larger as a comparison result,
25 and, in the lighting devices, the control portion carries out control to reduce the

light intensity of the light source by a first predetermined value when a comparison result that the sampled illumination is larger than the target illumination is received and the judgment portion judges that light intensity reduction control should be carried out, the control portion carries out control to
5 increase the light intensity of the light source by a second predetermined value when a comparison result that the sampled illumination is smaller than the target illumination is received and the judgment portion judges that light intensity increase control should be carried out, a portion of the lighting devices carries out one of the reduction control and the increase control, a number of the
10 lighting devices that is larger than the number of the lighting devices of said portion carries out the other, and the lighting devices that carry out the reduction control and the light increase control are switched in sequence, thereby causing the sampled illumination to approach the target illumination.

- 15 17. The lighting control system according to any of claims 5 to 8,
wherein the local device further includes a lighting device designating portion that selects, from the received ID information, the ID information for designating the lighting devices that carry out the reduction control or the light increase control by transmitting the ID information;
20 wherein the comparison portion outputs information on which of the sampled illumination and the target illumination is larger as a comparison result;
wherein the lighting device designating portion selects the ID information of the lighting devices that will reduce the light intensities, when the comparison result is that the sampled illumination is larger than the target illumination, and
25 transmits the comparison result and the ID information to said lighting devices,

and selects the ID information of the lighting devices that will increase the light intensities, when the comparison result is that the sampled illumination is smaller than the target illumination, and transmits the comparison result and the ID information to said lighting devices;

5 wherein, in the lighting devices that received the comparison result and the ID information of their own, the control portion carries out control to reduce the light intensity of the light source by a first predetermined value when a comparison result that the sampled illumination is larger than the target illumination is received and the judgment portion judges that the light intensity
10 should be reduced, and the control portion carries out control to increase the light intensity of the light source by a second predetermined value when a comparison result that the sampled illumination is smaller than the target illumination is received and the judgment portion judges that the light intensity should be increased; and

15 wherein the ID information is selected such that a portion of the lighting devices carries out one of the reduction control and the light increase control, and a number of the lighting devices that is larger than the number of the lighting devices of said portion carries out the other, thereby causing the sampled illumination to approach the target illumination.

20

18. The lighting control system according to any of claims 4 to 8,
 wherein the judgment portion carries out a judgment as to whether a predetermined condition is met, based on the received comparison result, and supplies a judgment result to the control portion;

25 wherein the control portion can carry out, based on the judgment result,

light variation control in which a light intensity value is changed from a current light intensity value in accordance with a predetermined amount of light variation, and return control in which the light intensity value is returned to a direction reverse to the light variation control;

5 wherein the sampled illumination is generated based on the light intensity values controlled by the control portions of the plurality of lighting devices;

 wherein, among a first control in which, when the judgment by the judgment portion is that the predetermined condition is met, the lighting devices
10 including at least one lighting device other than the lighting device that carried out the previous light variation control are selected to perform light variation control,

 a second control in which, when the judgment result is that the predetermined condition is not met, in order to meet the predetermined condition,
15 any of the plurality of lighting devices or the lighting devices including at least one of the lighting devices that carried out the previous light variation control perform the return control so that the predetermined condition is met, and then the lighting devices including at least one lighting device other than the lighting device that carried out the previous light variation control is selected to perform
20 light variation control,

 a third control in which, when the judgment result is that the predetermined condition is met, at least one of the plurality of lighting devices is selected, and the selected lighting device performs the light variation control until the judgment of the judgment portion indicates that the predetermined condition
25 is not met, and

a fourth control in which, when the judgment result is that the predetermined condition is not met, in order to meet the predetermined condition, any of the plurality of lighting devices or the lighting device including at least one of the lighting devices that carried out the previous light variation control perform
5 the return control such that the predetermined condition is met, and then the lighting devices including at least one lighting device other than the lighting devices that carried out the previous light variation control is selected to perform the light variation control until the judgment of the judgment portion indicates that the predetermined condition is not met,

10 the first control and the second control are carried out to cause the sampled illumination to approach the target illumination,
or, among the third control and the fourth control, at least the fourth control is repeated to cause the sampled illumination to approach the target illumination.

15

19. The lighting control system according to claim 18,
wherein a single lighting device other than the lighting devices that carried out the previous light variation control is selected in the first control, and the lighting devices including said single lighting device carry out the return
20 control in the second control; or,

wherein a single lighting device is selected from the plurality of lighting devices in the third control, and, in the fourth control, a single lighting device is selected from the lighting devices other than the lighting devices that carried out the previous light variation control to perform light variation control, and the
25 lighting devices including said single lighting device carry out the return control.

20. The lighting control system according to any of claims 4 to 8,
wherein the judgment portion carries out a judgment as to whether a
predetermined condition is met, based on the received comparison result, and
5 supplies a judgment result to the control portion;

wherein the control portion can carry out, based on the judgment result,
light variation control in which a light intensity value is changed from a current
light intensity value in accordance with a predetermined amount of light
variation, and return control in which the light intensity value is returned to a
10 direction reverse to the light variation control;

wherein the sampled illumination is generated based on light intensity
values controlled by the plurality of lighting devices;

wherein the lighting devices respectively carry out the light variation
control, and, when the judgment is that the predetermined condition is not met
15 after the light variation control, at least a portion of the lighting devices carries
out the return control in order to meet the predetermined condition; and

wherein the sampled illumination is caused to approach the target
illumination by applying, for each of the lighting devices, at least one of: setting of
the predetermined amount of light variation as an amount that is varied
20 randomly; setting of a return variation amount in the return control as an amount
that is varied randomly; random changing of a timing for carrying out the light
variation control; and random changing of the frequency of the light variation
control.

25 21. The lighting control system according to any of claims 4 to 20,

wherein, when the comparison result in the local device is expressed as two values, only one state of the two values is supplied to the judgment portion as the comparison result, thereby causing the sampled illumination to approach the target illumination.

5

22. The lighting control system according to any of claims 18 to 20,

wherein when there is a single local device in the lighting control system, the judgment portion judges that the predetermined condition is met when the comparison result is that the sampled illumination and the target illumination
10 are in a constant relation and judges that the predetermined condition is not met when the comparison result is that the sampled illumination and the target illumination are not in a constant relation;

wherein when there are a plurality of local devices and at least two comparison portions, the judgment portions of the lighting devices judge that the
15 predetermined condition is met when the comparison results are that the sampled illuminations and the corresponding target illuminations are all in a constant relation and judges that the predetermined condition is not met when the comparison results are that at least one is not in a constant relation; and

wherein the constant relation is a relation in which, when the
20 predetermined amount of light variation is a decrement, the sampled illumination is larger than the corresponding target illumination, and a relation in which, when the predetermined amount of light variation is an increment, the sampled illumination is smaller than the corresponding target illumination.

25 23. The lighting control system according to any of claims 18 to 20,

wherein, when the light intensity values of the lighting devices that received the comparison result are initially set to their respective maximum or minimum values or when the predetermined condition is not met, the respective light intensity values are changed in a direction of variation in the return control
5 so that the predetermined condition is met.

24. The lighting control system according to any of claims 18 to 20,
wherein all the lighting devices that received the comparison result carry out the return control.

10

25. The lighting control system according to any of claims 18 to 20,
wherein the return amount of light variation in the return control is a return amount of light variation by which a state before the previous light variation control is restored, or an arbitrary return amount of light variation that
15 is returned to a direction reverse to a direction of control in the previous light variation control.

26. The lighting control system according to any of claims 18 to 20,
wherein at least one of the predetermined amount of light variation and
20 the amount of light variation in return control is an amount of light variation based on a difference between the sampled illumination and the target illumination.

27. The lighting control system according to any of claims 18 to 20,
25 wherein at least one of the predetermined amount of light variation and

the amount of light variation in return control is set for each of the lighting devices.

28. The lighting control system according to any of claims 18 to 20,
5 wherein at least one of the predetermined amount of light variation and the amount of light variation in return control is reduced in response to a convergence in which the sampled illumination approaches the target illumination, or reduced along with a passing of time until convergence.

10 29. The lighting control system according to any of claims 18 to 20, wherein the number of lighting devices selected from the lighting devices that receive the comparison result to carry out light variation control is caused to approach one in response to a convergence in which the sampled illumination approaches the target illumination.

15

30. The lighting control system according to any of claims 4 to 8, wherein the judgment portion generates an evaluation value base on the received comparison result, and supplies a judgment result based on the evaluation value to the control portion;

20 wherein the control portion can change a light intensity value, based on the judgment result obtained from the judgment portion; and

wherein at least one of the plurality of lighting devices that received the comparison result randomly changes a current light intensity value, and narrows the range of light intensity value that is randomly changed, based on the
25 judgment result obtained from the judgment portion, thereby causing the sampled

illumination to approach the target illumination.

31. The lighting control system according to claim 30,

wherein the plurality of lighting devices that received the comparison
5 result respectively change current light intensity values randomly, and narrow
the range of light intensity values that are randomly changed, based on the
judgment result obtained from the judgment portion, thereby causing the sampled
illumination to approach the target illumination.

10 32. The lighting control system according to claim 30,

wherein a plurality of local devices are provided, the judgment portion
totals the comparison results obtained from the comparison portions of the
plurality of local devices to calculate an evaluation value, carries out a judgment,
supplies a judgment result to the control portion and the control portion narrows
15 the range of light intensity values that are randomly changed, based on the
obtained judgment result, thereby causing the sampled illumination to approach
the target illumination.

33. The lighting control system according to claim 30,

20 wherein the comparison portion acquires difference information that is a
difference between the sampled illumination and the corresponding target
illumination, and transmits the difference information as the comparison result,
the judgment portion totals the received comparison results to calculate an
evaluation value, carries out a judgment, and supplies a judgment result to the
25 control portion, and the control portion narrows the range of light intensity values

that are randomly changed so as to increase an occurrence rate of light intensity values corresponding to evaluations of small difference information, based on the obtained judgment result, thereby causing the sampled illumination to approach the target illumination.

5

34. The lighting control system according to claim 30,

wherein the comparison portion transmits large-small information indicating which of the sampled illumination and the corresponding target illumination is larger, the judgment portion totals the received large-small
10 information to calculate an evaluation value, carries out a judgment, and supplies a judgment result to the control portion, and the control portion narrows the range of light intensity values that are randomly changed so as to counterbalance large information and small information of the large-small information, based on the obtained judgment result, thereby causing the sampled illumination to
15 approach the target illumination.

35. The lighting control system according to any of claims 18 to 34,

wherein at least one of the light intensity value in the light variation control and the light intensity value in the return control is varied continuously.
20

36. The lighting control system according to any of claims 4 to 35,

wherein at least one of the light intensity values of the plurality of lighting devices, the sampled illumination and the target illumination is output to a display.

25

37. The lighting control system according to any of claims 4 to 36,
wherein light intensity values of the lighting devices at a final stage of the
convergence can be stored and the light intensity values of the lighting devices
can be reproduced by receiving an instruction.

5

38. A light source constituting the lighting control system according to any of
claims 1 to 37.

39. A lighting device constituting the lighting control system according to any
10 of claims 1 to 37.

40. A local device constituting the lighting control system according to any of
claims 1 to 37.